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Entomology Technicians Training Report— Democratic Republic of Congo

Integrated Vector Management (IVM) Task Order 2

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Prepared by:
RTI International
3040 Cornwallis Road
Post Office Box 12194
Research Triangle Park, NC 27709-2194

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MISSION REPORT

TRAINING IN BASIC MEDICAL ENTOMOLOGY IN DEMOCRATIC REPUBLIC OF CONGO (DRC), KINSHASA, APRIL 9-21, 2012

By
Professor Martin Akogbeto, RTI Consultant

According to the memorandum of Agreement concluded on March 15, 2012 with Research Triangle Institute (RTI), we carried out a consultation mission at the National Institute of Bio-medical Research (INRB) in Kinshasa, in Democratic Republic of Congo DRC) from April 06 to April 21, 2012. As soon as we reached Kinshasa on April 07 at 11:30 a.m by flight KQ 554 from Nairobi, we were welcomed by the entomologist of the National Institute of Bio-medical Research (INRB), Francis Watsenga and his colleagues, Thierry Bobanga and Emile Zola Manzambi with whom we had our first discussion about the goal of the mission.

TERMS OF REFERENCE OF THE MISSION (SCOPE OF WORK)

Background

The U.S. Agency for International Development (USAID) offers technical and financial support at the global and country levels for the implementation of malaria and other vector borne disease control activities. Under the Integrated Vector Management Task Order II (IVM 2), the Research Triangle Institute (RTI International) is providing technical assistance resources to institutionalize best practices, conduct operational research and strengthen the management capacities of country programs. The objective is to advance the state of the art of vector control to facilitate and sustain the effective management of disease vectors and reduce local disease burdens. IVM 2 compliments the overall strategy of the President's Malaria Initiative (PMI) in Africa.

As part of the above mandate, the project is supporting the development national capacities in USAID focus countries for entomological monitoring and surveillance to support vector control implementation. Activities include conducting targeted training and establishing insectaries and entomology laboratories and development of national vector surveillance schemes. Under the Malaria Operation Plans of the PMI, IVM project is tasked with supporting baseline entomological monitoring in selected provinces of DRC. A 2-week

entomology technicians training course is being organized in March 2012, to create a critical mass of field personnel for the proposed baseline survey. The training and survey activities are being done under the auspices of the NMCP and led technically by *the Institut National de Recherche Bio-Médicales* [INRB], with the support of staff from *Faculté de Médecine, Université de Kinshasa* (FoM).

The training will ensure that methodologies employed in the survey are standardized. following priority areas will be covered:

- Basic malaria eco-epidemiology- including role of vector(s), primary interventions
- Species identification (morphological)
- Adult and larval sampling techniques
- Transmission indices (pyrethrum catches for density assessments, landing catches –outdoor/indoors etc.)
- Fundamentals of laboratory rearing of mosquitoes
- Wall bio-assays on insecticide decay rates and knock down assessments on LLINs
- Vector susceptibility evaluations
- Preparations, labeling and storage of vector samples

Purpose

Dr Martin Akogbeto, is being engaged as consultant to provide technical support for an entomology technician's training course in DRC. The Consultant will work closely with the IVM Project Staff; Mr Francis Watsenga, lead Investigator at INRB; and Dr Thierry Bobanga, deputy lead investigator from FoM. The consultant to undertake the following tasks:

- Support the finalization of technical content of, and curriculum for the training;
- Serve as the expert instructor during the training
- Provide advisory functions to finalizing operational plans for an entomological monitoring baseline survey in selected DRC

Deliverables

- 2-week training of about 22 entomology technicians in DRC in March 2012.
- Finalized operational plans for baseline entomological monitoring

TRAINING COURSE

1. Opening Day

The opening Day was Monday April 9, 2012 at 9:00 a.m at Nganda Catholic Center. After the introductory speeches of Mr. David, Vestergaard representative, Mr. Francis Watsenga, INRB representative, Dr. Thierry Bobanga, Representative of the Faculty of Medicine of Kinshasa University, Professor Martin Akogbéto, RTI Consultant and the one of Dr. José Tchofa, USAID representative, Dr. Angbalu, Deputy Director of the National Malaria Control Program thanked the United States Agency for International Development (USAID) which provides technical and financial support to African countries for the implementation of malaria control activities and other vector born diseases. He also thanked RTI and Vestergaard for funding the training. According to the Deputy Director of NMCP, entomological research and vector control are the poor relations of Malaria research and the methods used to fight against diseases in Congo. Therefore, very few data are available in the

field of Entomology in Congo. The training organized by the RTI is then a great opportunity to train technicians about basic entomology to support the National Institute of Bio-medical Research for monitoring the dynamics of malaria and the susceptibility of the vectors to insecticides in Congo. That's how the Deputy Director of NMCP launched the training after having wished the trainees and the RTI consultant a nice stay in Congo.

2. Implementation of the training.

We reached Kinshasa on Easter weekend, precisely on Saturday April 7. That weekend was used to work out a pre-test that would help assess the level of each participant regarding basic malaria entomology. It would also help to assess the progress after two weeks of training as the participants to the training did not have the same profile and were from different backgrounds. The theoretical section of the training took place at Nganda Catholic Center. The trainees and the consultant were housed at INRB for the practical section. The training was made up of four sections: a theoretical section, a practical section on the field and in the laboratory, the finalization of the operational plan of the activities to implement in the regions and finally, a pre-test/post-test evaluation.

3. The theoretical section

This theoretical section of the training started on Monday, April 9 in the morning after the organizers had reminded the trainees of the context of the training and the expectations from it. First, the planning of the two weeks and an introduction about medical entomology were presented. The planning was as follows techniques:

- Identification of malaria vectors (mosquitoes morphological identification) ;
- Sampling larvae and adult mosquitoes;
- Rearing mosquitoes in the laboratory;
- WHO susceptibility testing and interpretation of results;
- Bioassay cone tests;
- Malaria stratification and vector control;
- Vector incrimination and malaria control (calculation of the density from two types of sampling: night human biting catch inside and outside the houses, and indoor residual spraying of insecticide...etc.);
- Malaria vector control;
- Preparation, labeling and conservation of mosquito samples.

The introduction to malaria entomology focused on the description of malaria transmission cycle, the mosquito's life cycle in relationship with the transmission, the goal and the role of entomological studies as regards malaria control.

All aspects in the planning were dealt with largely during the first week. During this period, each of the facilitators including F. Watsenga, T. Bobanga, E. Manzambi, and M. Akogbéto intervened according to their individual skills.

The courses were mainly based on PowerPoint presentations. The trainees could stop the facilitators at any time for clarification. Demonstration works were performed after some courses to help the trainees get the message better. The WHO document entitled 'Malaria entomology and vector control' (WHO/CDS/CPE/2002. 18 Rev. 1, Part 1, French version, Temporary Edition, July 2003) was elaborated as a booklet and distributed to the trainees. A lot of PowerPoint presentations focused on sampling of anopheles populations and the various mosquito habitat especially as far as anopheles is concerned.

4. Practical sessions

They were held at INRB. However, some practice demonstrations were organized at Nganda Center together with the presentations to reinforce the immediate comprehension of the courses.

The practical sessions included:

Sampling techniques for mosquito larvae and adults

✓ A session of mosquito larvae recognition was organized on the field on Friday, April 13. During this session, *Anopheles gambiae* larvae were collected not far from the NMCP in the half-dried bed of Congo River. On this occasion, the trainees dealt with the recognition of the different larval stages as well as the different types of mosquitoes there. The larvae were taken back to INRB for morphological identification and conservation.

✓ A night catch was organized on April 16 on the site of Nganda Catholic Center. The trainees were the mosquito collectors. From 8:00 p.m to 10:00 p.m, lots of mosquitoes were caught by all trainees. This session showed us that the sampling technique of *Anopheles* by human landing catch was mastered.

✓ On April 17, mosquito collection by indoor residual spraying (spray catch) was performed by the trainees at Luka Camp, a suburban town in Kinshasa. The mosquitoes caught at night and the ones collected after indoor spraying were taken back to INRB for morphological identification and conservation.

Morphological identification of the mosquitoes

The trainees learnt how to make the difference between *Anopheles* and the other Culcidae, morphologically, to the naked eye and under the stereo microscope. An identification evaluation was organized on Tuesday, April 17, 2012. The result of this first evaluation showed that it was 17 trainees who succeeded in making a good identification out of the 24 trainees assessed. Then, after an individual monitoring of the trainees, the next day, the evaluation was repeated and the results were better: all trainees could successfully separate *Anopheles* from the other types of mosquito.

Completion of susceptibility testing and interpretation of the results

Several demonstrations of the susceptibility testings were made by the facilitators before letting the trainees perform. During the testings, a stress was put on the conditions for testing and what to avoid during manipulations so as not to traumatize the mosquitoes.

Performing bioassay cone tests

Olyset^R and Permanet 2.0^R mosquito nets were cut on the 5 faces and the pieces were used for testing. Here also, the facilitators insisted longly on the procedure and conditions of performing this testing professionally.

Preparation, labeling and conservation of samples of mosquitoes

This section was considered very important because one of the roles of the new technicians in medical entomology is carrying mosquitoes to their center after capture and then sending them to INRB. It is important to mention that mislabeling mixes up the samples, creating a confusion and also making them lose their origin. Besides, poor preservation of the samples destroys the mosquitoes. Thus, false or unusable results are obtained at the treatment stage. To avoid such mistakes as professionals, the trainees were given strict instructions about this.

Rearing mosquitoes in the laboratory

Visiting the insectary of INRB helped us notice the conditions in which mosquitoes are reared : temperature and humidity conditions, food of larvae and adults, nymph sorting...etc.

Evaluation

It included a pre-test and a post-test as well as the identification of mosquitoes. Its purpose was to check to what level the courses had been assimilated by the trainees and to what level the information had been transferred to them. Actually, this was not to punish them with assessment scores at all.

Result of the pre-test:

Number of participants: 18 (4 participants had not reached Kinshasa yet)

Number of participants with the average (the average was 10.05): 11, representing 61,1%

Group average: 11.05/21

Result of the post-test:

Number of participants: 24

Number of participants with the average (the average was 10.05): 24, representing (100%)

Group average: 17.27/21

The facilitators availed themselves of the last session of the training to give the results and publicly congratulate the trainees for the progress achieved.

Drafting the operational plan of the activities to perform in the provinces.

A draft operational plan was submitted by INRB for finalization. That was a good project. Discussions focused on how many villages and dwellings to choose per site especially for night catches. The INRB is responsible for providing the necessary precisions depending on the budget allotted and the number of local mosquito collectors to recruit.

Conclusion

The organization of the training was perfect. As soon as we reached Kinshasa, we were warmly welcomed by the entomologist of the National Institute of Bio-medical Research (INRB), Francis Watsenga and his colleagues, Thierry Bobanga and Emile Zola Manzambi as well as the focal point of the NMCP, Lidy Kalindula Azama.

The training and the accommodation of the trainees was at Nganda Center, a very nice place allowing a quick gathering of the trainees. The practical sessions were organized at INRB, an institute with the basic technical platform required for basic research activities in medical entomology. In addition, the staff of INRB with Francis Watsenga as head, has the minimum human resources and competences required to conduct good entomological researches and serve as experts to support the vector control activities of the NMCP. As a matter of fact, in Africa, the National Malaria Control Programs use effective control methods against malaria but what often lacks is an evaluation. Research should be an integral component of the planning, the implementation and monitoring-evaluation of any control intervention. That's why it is desirable that the INRB participate in the elaboration of the action plan for malaria together with the NMCP. The research part should be the work of the INRB.

The training was successful. The goals are reached. The trainees have received a good basic training. They are now equipped to identify the habitat of anopheles larvae on the field, collect the larvae, rear them to have adults, perform susceptibility tests to insecticides, perform sampling of adults using human landing catch and indoor residual spraying

techniques, identify mosquitoes at the genus level and make sure they are carried to INRB in good conditions as required by the profession. At the end of the training, fruitful discussions helped to finalize the action plan for a basic entomological monitoring in Congo.

Acknowledgement

I thank the NMCP, the USAID and RTI for giving me the opportunity to take part in this training together with my Congolese entomologist colleagues from whom I learnt a lot.

I thank my colleagues and all the staff of INRB and of the Faculty of Medicine of Kinshasa University who organized this training. I thank all of them for their very warm welcoming and congratulate them on succeeding in the organization of the courses.

I also thank the trainees with whom I worked in conviviality. They were very enthusiastic learners, hard working, very disciplined and always on time for the courses. I keep a very nice image of them.

Appendix : Pré-test

FORMATION EN ENTOMOLOGIE DU PALUDISME EN RDC

Répondre aux questions suivantes en soulignant directement sur la feuille la lettre correspondant à la bonne réponse

1. Les moustiques se ressemblent, mais ils sont différents morphologiquement :
a). Vrai ; b). Faux
2. Le paludisme est transmis par un moustique du genre :
a). Aedes b). Anopheles c). Culex
3. Les larves d'anophèle sont reconnaissables dans l'eau par:
a). Position oblique et siphon dirigé dans l'air pour capter l'oxygène
b). Position horizontale à la surface de l'eau
4. Au repos, les anophèles sont reconnaissables par leur position oblique par rapport au support
a). Vrai ; b) Faux
5. Le cycle de développement des larves d'anophèle passe par :
a). 3 stades ; b). 8 stades ; c).4 stades
6. La durée de vie d'un moustique est de :
a) 72 heures ; b) 1 an ; c) 2-3 mois
7. Parmi les gîtes de développement des larves de moustiques ci-dessous, 2 sont ceux préférés par les anophèles :
a). les fûts abandonnés ; b) les canaris et jarres abandonnés ; c) les flaques d'eau ensoleillée ;
d) les boîtes de conserve abandonnées ; e) les pneus abandonnés ; d) les bordures des rizières
8. Les moustiques anophèles (Anophelins) se distinguent des autres moustiques (Culicins) par :
a). Chez les anophèles, les palpes sont aussi longs que la trompe
b). Chez les autres moustiques (Culicins) les palpes sont aussi longs que la trompe
9. Les moustiques anophèles préfèrent les petites collections d'eau ensoleillée, propre, limpide :
a). Vrai b) Faux
10. Les moustiques non anophèles, en particulier les moustiques du genre Culex, préfèrent les gîtes sales, pollués
a) Faux b) Vrai
11. Le mâle et la femelle des moustiques se distinguent par :
a). les antennes ; b). la trompe ; c). les palpes
12. Lequel des cycles ci-après se déroule chez le moustique ?
a). cycle érythrocytaire ; b). cycle exo-érythrocytaire ; c). cycle sporogonique
13. Quelle est la localisation de prédilection des sporozoïtes chez l'anophèle ?
a). l'estomac ; b). le foie ; c). les glandes salivaires
14. Les anophèles sont des moustiques qui sont actifs :
a) le jour ; b) la nuit
15. Parmi les 3 méthodes de lutte ci-après, laquelle a un impact direct sur la réduction de la longévité des moustiques ?
a). la lutte anti-larvaire ; b). la pulvérisation intra-domiciliaire d'insecticide; c). l'utilisation des moustiquaires
16. En RDC, le paludisme est un problème environnemental qui ne se transmet pas de la même manière d'une région à l'autre, d'où l'existence de plusieurs faciès épidémiologiques.
a). Vrai b). Faux
17. Les moustiques les plus jeunes sont plus aptes à transmettre le paludisme que les moustiques vieux.

a). Vrai ; b) Faux

18. La durée du cycle gonotrophique chez le moustique est la durée qui sépare le repas de sang de la ponte. Cette durée est de :

a). 2-3 jours ; b) 1 heure ; c) 2 semaines

19. Vous trouverez ci-dessous différentes méthodes de capture des moustiques. Cochez la méthode la plus appropriée à l'étude de la transmission du paludisme :

a). capture par les pièges-fenêtres ; b) capture sur homme ; c) capture par aspersion d'insecticide, d) capture par le piège CDC

20. Les moustiquaires PermaNet sont imprégnées avec :

a). la deltaméthrine ; b) la perméthrine ; c) la lambdacyhalothrine, d) la cyperméthrine ; e) l'alpha-cyperméthrine ; f) la cyfluthrine

21. Les moustiquaires Olyset sont imprégnées avec :

a). la deltaméthrine ; b) la perméthrine ; c) la labdacyhalothrine, d) la cyperméthrine ; e) l'alpha-cyperméthrine ; f) la cyfluthrine